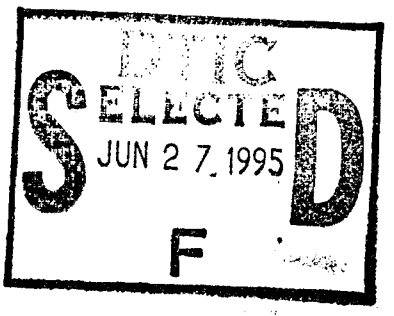
JSSAP 17

The Objective Personal Weapon Shooters' Conference 22-23 February 1995



Bernard J. Tullington, Walter R. Bowers, and John N. Lesko

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Tactical Warfare Simulation and Technology
Information Analysis Center
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Columbus, Ohio 43201-2693

June 1995

Final Report

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U.S. Army Armament Research, Development
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Joint Service Small Arms Program
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13. ABSTRACT *(Maximum 200 words)*

The purpose of this report is to assist the Joint Service Small Arms Program (JSSAP) Office in defining the requirements for the Objective Personal Weapon, OPW, which is a member of the Objective Family of Small Arms. This report documents the early efforts to address preliminary goals for the (OPW) and the agreements reached at a Shooters' Conference held in FEB 1995. The report contains: description of the conference, list of attendees, and description of how the various users foresee the application of an OPW; summary of each briefing and specific goals identified that each shooter felt is needed; discussions of each OPW goal as agreed to by the participants, with caveats identified as appropriate; and conclusions reached by the attendees (with exceptions as noted) in general terms as to the operational environment, targets, time frame of interest, performance parameters, and weapon characteristics.

These preliminary goals and expressions of needs will form the basis of a Small Arms Symposium with the ADPA in June 1995, where the goals will be explained to industry representatives. A subsequent conference among interested industry and government agencies will be held in August where potential technology approaches to meeting the stated goals will be presented, and discussed.

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Preface

This research was sponsored by the U. S. Army Armament Research, Development and Engineering Center, Picatinny Arsenal, New Jersey, and monitored by the U.S. Army Missile Command (MICOM), AMC - Smart Weapons Management Office, Redstone Arsenal, Alabama, under Contract No. DAAH01-91-D-R006. Mr. Joel Goldman was the Technical Monitor for this effort.

Other information which pertains to this effort is as follows:

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Project Scientist: Dr. Larry W. Williams (614) 424-5047

Principal Investigator: Mr. Bernard Tullington (703) 413-8866

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Contents

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The Objective Personal Weapon
Shooters' Conference 22-23 February 1995

by

Bernard J. Tullington, Walter R. Bowers, and John N. Lesko

1.0 Introduction

1.1 Background

The Joint Service Small Arms Program (JSSAP) Office has as part of its mission to harmonize and execute Joint research, development, test, and evaluation (RDT&E) projects and to establish Joint Service requirements for small arms. Small arms are identified as...

> "man portable, individual and crew-served weapon systems used against protected and unprotected personnel and light/unarmored vehicles. Included among these weapon systems are ballistic and non-ballistic systems and associated munitions, aiming, power storage and other ancillary items."

In fulfilling that mission the JSSAP Management Committee developed a Joint Service Small Arms Master Plan (JSSAMP). This plan is based on the small arms master plans or strategies of the six participating service entities (the Army, Navy, Air Force, Marine Corps, Coast Guard and Special Operations Command). The JSSAMP identifies incremental improvements for currently fielded weapons, utilizes technology advancement that leads to significant improvements in the role and effectiveness of future small arms, and specific system oriented developments to create a future Objective Family of Small Arms. This Objective Family of Small Arms consists of Individual Combat, Crew-Served, and Personal Defense Weapons. The plan also includes a Sniper Weapon, Mission Specific Weapons and Technology Advancement. Within this organizational and programmatic context, a shooters' conference was held to identify and refine the goals for the Objective Personal Weapon (OPW).

1.2 Purpose

The purpose of the Shooters' Conference was threefold. One was to share information on the tactical, training, safety and performance needs of personal weapon operators from the United States Armed Forces and Federal Law Enforcement Agencies. The second, was to reach agreement on a common set of capabilities and characteristics of the OPW. The third, was to capture the information in a form that could serve as a steering document during the initial phase of the OPW program.

These preliminary goals and expressions of needs by the shooter community will form the basis of a Small Arms Symposium with the American Defense Preparedness Association

(ADPA) in June 1995, where the goals will be explained to industry representatives. A subsequent conference among interested industry, the JSSAP Office, and other appropriate government agencies will be held in August where potential technology approaches to meeting the stated goals will be presented, and discussed. Assuming these activities lead to favorable conclusions a more definitive program will then be formulated to get under way in 1996 or 1997.

1.3 Report Organization

This report documents the early effort to address the preliminary goals for the Objective Personal Weapon (OPW) and the agreement reached at a Shooters' Conference in Picatinny Arsenal, NJ, on 22 and 23 February 1995. The remainder of the report is organized as follows:

Section 2 provides a description of the conference, identifies the attendees, and describes how the various users foresee the application of an OPW. A summary of each briefing is presented in Section 2.1. Section 2.2 discusses each OPW goal as agreed to by the participants, with caveats identified as appropriate.

Section 3 presents the conclusions reached by the attendees (with exceptions as noted) in general terms as to the operational environment, the targets, the time frame of interest, performance parameters, and weapon characteristics.

The memorandum announcing the conference and a list of attendees are given in Appendix A. Copies of individual presentation material are given in Appendix B. A bibliography of reference literature is given in Appendix C. Some historical engagement data of interest pertinent to ranges, handholds, and number of rounds fired per engagement are given in Appendix D.

2.0 Shooters' Conference

The Shooters' conference was held in the JSSAP offices at Picatinny Arsenal on 22-23 February 1995. The format of the conference allowed each presenter an opportunity to describe the operational applications and environmental circumstances surrounding their particular use for a personal weapon. Each presenter was also asked to identify those objectives, capabilities, and characteristics needed for an Objective Personal Weapon. Each presentation was followed by open and candid discussions. There were areas of overlap among the many objectives. The uniqueness of many objectives was expected from such a diverse group, yet agreement was possible that placed bounds (often expressed as threshold vs. objective) on particular goals. These needs and desires, as expressed by the shooters during discussion sessions, were captured and subsequently briefed back to the group as a set of initial goals appropriate for an Objective Personal Weapon. This ensured all important goals, from the shooters' perspective, had been included and that there was general agreement on the goals.

2.1 Presentations

A copy of the briefing material for each of the presentations on day one is at Appendix B.

Highlights from these briefings are listed in Table 1 in the order in which they were presented at the conference. Administrative and procedural remarks and presentations are not summarized.

2.2 OPW Goals

The goals identified by the shooters were stated in terms similar to those currently in use in the Joint Service Small Arms Master Plan for the Objective Personal Defense Weapon. Other than the time frame which was established as 2010, other items were open for discussion. These goals are discussed below within the following categories: Operational Environment, Targets, Time Frame, Range, Accuracy, Effects, and Characteristics.

2.2.1 Operational Environment. It is anticipated that this weapon will be used under all weather conditions; day or night; in all conditions to include wind, rain, fog, snow; on land; in the air; and on/under/coming out of the sea. The most stringent of these objectives is for it to be able to perform its mission after coming through the surf zone which has traditionally been the most difficult. The OPW will be exposed to a maximum pressure of 3 atmospheres, (99 feet) in salt water. The fire control system should be sufficiently robust to allow the operator to get the desired effect on target in all of these conditions.

Table 1. Presentation Highlights

Presenter	Highlights from their presentation
Steve Small OPW Project Manager JSSAP Office Picatinny Arsenal	Purpose of the OPW Shooters' Conference... • OPW Defined • Traditional role of handguns, sub-guns, and carbines • Historic examples of Personal Weapon employment • Trade-offs of size, weight, configuration vs. capability • Current capabilities vs. The Future Threat • Shooters' Conference Guidelines • Concept of the Conference (i.e., agenda for 2 days) • Future Plans -- Industry/Government Conference
Joel Goldman Deputy Director JSSAP Office Picatinny Arsenal	Joint Services Small Arms Master Plan (JSSAMP) • Small Arms Definition • JSSAP Mission • JSSAP Management Committee, Structure, & Vision Statement • Program Objectives and Philosophy • JSSAMP contains: Objective Family of Small Arms, Fielded System Improvements, Mission Specific Weapons, and Technology Advancement
CPT Steve Mills US Army MP School Combat Developments	• Doctrinally, the MPs are responsible for Rear Area Security, Battlefield Circulation & Control, and various Law Enforcement Missions. • Primary missions include: Rear Area Response Force, Critical Site Security, and Reconnaissance. Secondary missions include: Felony Apprehension, Criminal Investigations, 'Third World' or Peacekeeping Operations. • Targets include: Personnel (unprotected & with body armor); POW control and Peacekeeping duties have less-than-lethal objective • Penetration thru thin-skinned vehicles and controlled penetration for SWAT missions are needs • Chemical Agents for crowd control may impact OPW.

Table 1. Presentation Highlights

Presenter	Highlights from their presentation
Tom Taylor Special Reaction Team (SRT) Training Office US Army MP School	• SRTs are equipped for entry, sniper, and counter-narcotics missions • Shortcomings in present systems include: Lack of submachine guns; Only a 10 power fixed magnification scope for M24 sniper rifle, a variable magnification is preferred over fixed magnification ; Lack of expanding ammunition; Shortages in night vision equipment; Need for a replacement shotgun; Need for less-than-lethal systems, CS-gas has pyrotechnic effects, OC (derivative of pepper spray) is used for ease in clean-up, but still viewed as inadequate due to inadequate delivery means.
GMCS Ron Webster NAVSPECWARCOM	• Current NAVSPECWARCOM inventory. • Tactical Deployment for Pistols, Submachine guns, and carbines -- Small confined Spaces; Corrosive Saltwater and Surf Zone environments; Need for covert (read: silenced) offensive weapon exists. • Training -- SEAL teams fire several thousand rounds from their weapons during 'week long' sessions -- all systems must be extremely reliable. • Safety/Environmental Issues include: Insensitive munitions; Hazards of Electromagnetic Radiation on Ordnance (HERO) safe; dual fuzing; airborne lead; eye safe; and corrosion resistance. • Capabilities and Characteristics for OPW. • Low magnetic signature.
Robert Spurlock HQ Air Force Security Police Agency	• USAF OPW Criteria Users include: Security Police, Special Op Air crews, Combat Controllers, Tactical Air Controllers, Rescue, AFOSI (investigators), Air crews and Miscellaneous Others • Missions range from law enforcement and base defense to VIP protection and 'asset' security (read: security of nuclear weapons) • USAF OPW Capabilities: Effective range <50 meters; 'instant incapacitation'; rapid fire/reload; semi & automatic fire; weight < 3 lbs. loaded; owner operation only (so-called 'smart gun'); low light, point & shoot one hand operations; concealable; reliable; high cartridge capacity; corrosion resistant; penetrate body armor @ 50 meters; air crew equipment compatible; easily maintained.

Table 1. Presentation Highlights

Presenter	Highlights from their presentation
LT Sciliano Navy SEAL	• Concurred with Chief Webster's briefing and added... • "...personal weapons are mostly used as a back up weapon. Used in tight confined spaces. Must be easily manipulated for either hand operation during ship boarding, in-flight ops, vehicle searches, and prisoner handling." • OPW must work in "... all weather conditions and allow for precise shooting as required in hostage rescue missions (i.e., enabling a 4" shot-group @ 50 yards)." • Other desirable characteristics include: reduced recoil to facilitate training (i.e., "must get on target and stay on target"); uniform trigger pull irrespective of firing mode (single - double action); magazine capacity >13 rounds; concealable; weapon's life > 30,000 rounds; grips no larger than a Colt M1911 .45 cal.; tritium sights adjustable for windage & elevation; 'optic' friendly (i.e., can add a sight without modification); must penetrate level IIIA body armor.
CWO Sam Spears US Coast Guard	• "... all at-sea boardings are armed boardings." • OPW must operate from the tropics to the arctic. • Controlled penetration / less-than-lethal effects a plus (+). • The CG is beginning to see requests for night sights. • Corrosion resistance an absolute must. • "...the M9 pistol has been meeting our needs...work to improve the grip screws (corrosion is an identified maintenance problem)...and make sure this weapon will fit in a holster."

Table 1. Presentation Highlights

Presenter	Highlights from their presentation
Special Agent Rick Warford SWAT Training Unit (STU) Critical Incident Response Unit (CIRG) Quantico, VA	• FBI has SWAT teams in every office (56 FBI centers across the country) • An OPW would be used by all FBI agents in the field -- ranging in missions from hostage rescue to all else • Environment is civil law enforcement - land, sea, and air - with personnel working in critical, high stress situations • Shot placement is the key to success -- ease in training is important -- we need to maintain a 2-3" shot-group @ 25 meters or less (most engagements are < 7 m) • 100% incapacitation with a less-than-lethal configuration available • Controlled or limited penetration (re: shooting thru wall board: "...we won't shoot at anything we can't see.") • Day and night operations 'a must' • Other characteristics/preferences include: 'user friendly' (read: points naturally and is simple to operate); moderately concealable; corrosion resistant finish; non-slip grips; > 10 rounds capacity; 2000 rounds MTBF and 50,000 rds. minimum frame life.
Jack Webb US Secret Service Department of the Treasury	• "VIP protection is our principal mission" • Weapon must penetrate body armor; commercially available hollow point bullets have desired effect • Accuracy < 6 minutes of angle @ 200 meters, (6" group at 200m) • Other characteristics include: Size smaller than the HK MP5 is desired; Easy manipulation and clearing of malfunctions; Easily concealed by a 'bicycle rider'; One agent's opinion: "...A weapon like the FN Herstal 5.7x28mm weapon system (P90) offers many of the features the Secret Service desires -- max accuracy and control, good sights, easy of disassembly and assembly, compact size, & full auto capability."

2.2.2 Targets. The primary target for this system is personnel under various circumstances. They include personnel with body armor that at the time of fielding is equivalent to the protection granted by Level IIIA today. It also includes personnel in light vehicles, and in structures. However, due to the concern regarding collateral damage, there is a desire for selectable penetration capability. For example, a shooter may want to penetrate body armor but not necessarily shoot through walls and injure the child sleeping in the next room.

2.2.3 Time Frame. 2010.

2.2.4 Range. The majority of uses for this weapon would be under 50 meters when used in its primary roles as a back-up or survival weapon. There are some specific applications that require a far greater range of 150 meters for a threshold and 200 meters as an objective. These cases involve the use of the system as a short range sniper system or as a backup for an individual who is operating a crew-served weapon that has a minimum arming range in excess of 100 meters.

2.2.5 Accuracy. Due to the ambiguity of the term "probability of hit" (definition of what is a hit, where it must be hit, and what level of expertise the operator has), it was decided that this goal would be stated in terms of ballistic capability of the system. An objective of 3 minutes of angle, (6 inches at 200 meters) and a threshold of 6 minutes of angle (12 inches at 200 meters) was established.

2.2.6 Effects. The desired effect is immediate incapacitation of the target. Incapacitation is defined as the target no longer being a threat to the operator of the system or anyone else. There was general agreement that this system should have the capability to incapacitate by both lethal and less lethal means. There was however disagreement on whether or not the capability to select lethal or less lethal should be in the hands of the operator. Concern was expressed that an option to select lethal or less lethal would place the operator in an unfair and possibly dangerous situation. For example, within the bounds of the rules of engagement, a Navy SEAL representative wants the system to always be lethal. They do not want a selector switch on the system that would slow the operator down due to an additional decision he would have to make. Furthermore, they are concerned that if an operator thought the weapon was on lethal, engaged a target, assumed it was dead, passed through the area, the target could once more become a threat. There are additional concerns that the typical military user would not have sufficient training to make a legal decision as to whether or not to use lethal or less lethal force. On the other hand, there was the desire on the part of some of the group to be able to make that selection. The conclusion was that the OPW should be capable of being produced in such a manner that it could be issued with or without an operator selectability option.

2.2.7 Characteristics. Realizing that the design of the OPW is open to what technology can deliver, the shooters used the current handgun to base most of their

comparisons when deliberating on the goals for a future personal weapon's characteristics. The agreed characteristics are that the weapon should:

- Weigh less than 3 pounds fully loaded
- Be easily concealable on the body in much the same manner as a conventional handgun is today
- Be capable of being carried in a holster to provide an aura of intimidation while not being openly displayed
- Be capable of being carried so both of the operator's hands are free for other purposes.
- Be operational with either hand to include all safeties, slide/magazine releases if applicable, etc.
- Have at least two safety mechanisms
- Be capable of servicing multiple targets prior to recharging/reloading.
- Have a uniform firing mechanism and firing procedure regardless of the method of operation (automatic, semi-automatic, single-action, or double-action). For example: the trigger pull, if there is one, should be the same for single action as it is for double action.
- Have a minimum recoil to facilitate the operator staying on target. For example: the recoil should not exceed that of the M9 pistol.
- Assist the operator in capitalizing on the weapon's inherent capabilities. It should be ergonomically friendly.
- Be as reliable and durable as possible. It must work as reliably as the M9 pistol. If it does malfunction, it must be easily and quickly remedied by the operator.
- Be simple to use. Easy to get on target and stay on target.
- Allow for the operator to train as he is going to fight. If special training ammunition is required, any deviation from actual performance should be transparent to the operator.
- Be capable of using current training facilities with minimal modification.

3.0 Conclusions

Following a review of the information collected from the first day's discussions, it was concluded that the goals, as stated at the conclusion of the review, represented an accurate expression of the goals as articulated by the shooters during the conference. In some cases the goals are identified as "threshold" (absolutely necessary), and is some cases they are shown as "objective" (desirable characteristics). The agreed goals are listed in Table 2.

Table 2. Objective Personal Weapon Goals

Category	Goals
Operational Environment	All weather, 24 hr, air land, sea (3 atmospheres) surf
Targets	Unprotected personnel, personnel with body armor, personnel in light vehicles, personnel in structures, through tempered glass
Time Frame	2010
Range	150 meters threshold 200 meters objective
Accuracy	6 minutes of angle threshold 3 minutes of angle objective
Effects	Immediate incapacitation (no longer a threat) Lethal & less lethal capability Reduced collateral damage Selected penetration
Characteristics	Easily concealable on a person Weight < 3 lbs fully loaded Selected fire (semi/automatic) Operate easily with either hand Primary & secondary safety Multiple engagement capability Uniform firing mechanism (e.g., trigger pull on a hand gun) Minimum felt recoil ($\leq$ 9 mm pistol) Ergonomic considerations Holsterable Reliable and maintainable equal to 9 mm pistol Simplicity of operation (get on target, stay on target) Realism and safety in training Low signature, objective Low magnetic signature, threshold

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Appendix A
AMSTA-AR-CCJ Memorandum dated JAN 13, 1995

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PICATINNY ARSENAL, NEW JERSEY 07806-5000

REPLY TO
ATTENTION OF

JAN 13 1995

AMSTA-AR-CCJ

MEMORANDUM FOR SEE DISTRIBUTION

SUBJECT: The Objective Personal Weapon (OPW) "Shooter's Conference"

1. The Joint Service Small Arms Program (JSSAP) Office will conduct a meeting for operators of handguns, carbines or sub-guns at Picatinny Arsenal, New Jersey on 22-23 February 1995. The purpose of this meeting is three-fold:

a. To share information on the tactical, training and safety needs and requirements of personal weapon operators from the United States Armed Forces and Federal Law Enforcement.

b. To reach agreement on a common set of capabilities and characteristics for the Objective Personal Weapon.

c. To capture the information generated at this meeting in a report. This report will serve as a steering document during the initial phase of the Objective Personal Weapon Program.

2. The thrust of this meeting, which will set the stage for a larger Government-Industry Conference to follow, is derived from the Joint Service Small Arms Master Plan (JSSAMP). This outlines the future small arms goals and desired performance characteristics for all branches of the Armed Forces, including the Coast Guard and Special Operations Command. This meeting will be used to revisit and refine the joint goals for the Objective Personal Weapon.

3. The Objective Personal Weapon "Shooter's Conference" will have as its attendees those individuals who, because of their training, operational experience or duty position, possess a high degree of insight into the various demands placed upon weapons of this category. We ask that each attendee come to this meeting prepared to discuss what it is that personal weapons are expected to accomplish and under what sort of circumstances such systems must operate (defense, and/or offensive).

JAN 13 1995

AMSTA-AR-CCJ
SUBJECT: The Objective Personal Weapon (OPW) "Shooter's Conference"

4. To ensure that the information discussed or presented at this meeting is effectively captured, we ask that each attendee who is providing a briefing, please bring a hard copy for its inclusion in the OPW "Shooter's Conference" Report.

5. The site of this meeting is U.S. Army Armament Research, Development and Engineering Center (ARDEC), Picatinny Arsenal, New Jersey 07806-5000. The meeting will be held in Building 1, 2nd Floor Conference Room 224. The meeting will begin at 0830 hours on 22 February 1995 and will conclude before 1130 hours on 23 February 1995. This meeting will be unclassified and the tentative agenda is at enclosure 1. Attached at enclosure 2 are directions from Newark Airport, area hotels and restaurants.

6. The Point of Contact is Mr. Steve Small, (201)724-7043, DSN880-7043, datafax (201)724-6930, DSN880-6930. We ask that you confirm attendance by 14 February 1995 with Mr. Small.

2 Enclosures
as

FOR JAMES B. ACKLEY
Chief, Joint Service Small Arms Program

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Objective Personal Weapon

Meeting Agenda

Day 1 - 22 February 1995

0830-0840	Welcome to Picatinny Arsenal	COL Sinclair

Briefings

Session Leader: Mr. Steve Small

0840-0850	Concept/Intent of Meeting	Mr. Small
0850-0900	Capture Plan	Mr. Tullington
0900-0920	USAIS	Mr. Haddigan
0920-0940	USSOCOM	GMC Webster
0940-1000	USMC	GySGT Seestadt
1000-1010	Break	
1010-1030	USAMPS	CPT Mills
1030-1050	USAAMU	Mr. Boyd
1050-1110	USAF	Mr. Spurlock
1110-1130	USN	Mr. King
1130-1150	USCG	CWO4 Spears
1150-1315	Lunch	
1315-1330	FBI	Mr. Warford
1330-1345	USSS	Mr. Wood

Discussion

Session Leader: Mr. Tullington

1345-1530	What is important to you - Capability, Configuration or Other (& Why)
1530-1600	OPW, What does it have to do better than existing systems (how much better?)

ENCLOSURE 1

Objective Personal Weapon

Meeting Agenda

Day 2 - 23 February 1995

Brief Back

Session Leader: Mr. Tullington

0800-0810	Administrative Remarks	Mr. Small
0810-0900	Essential Elements of Information	Mr. Tullington

Future Plans and Conclude

0920	Future plans and conclude	Mr. Small

Appendix B
Attendance Roster and Briefings Given by Conference Attendees

(1) Attendance Roster for the JSSAP Sponsored OPW Shooters' Conference Held on 22-23 February 1995

(2) Briefings

- Steve Small, JSSAPO
- Joel Goldman, JSSAPO
- CPT Steve Mills, US Army TRADOC, MP School's Position
- MCS Ron Webster, Naval Special Warfare Command
- Robert Spurlock, HQ Air Force Security Police Agency
- Special Agent Jack Webb, Secret Service, Washington, DC
- Leo E. Labaj, DOE - ORNL, Special Projects Office

Tab 1: Attendance Roster for the JSSAP sponsored Objective Personal Weapon Shooters' Conference held on February 22-23, 1995, at Picatinny Arsenal, New Jersey

Name	Organization	Phone Numbers
Ralph Cherry	CNSWG-1 (N4) Coronado, CA	619-437-0952
Joel Goldman Deputy Director	JSSAP Office, ARDEC AMSTA-AR-CCJ Picatinny Arsenal, NJ	201-724-6906 fax: 724-6930
Ron Gorsling	CNSWG-2 (N4) Norfolk, VA	804-363-4919
Leo E. Labaj	Martin Marietta Energy System, Special Projects Office, Oak Ridge, TN	615-241-3295
Eric Lindsay	5th Special Forces Group (Airborne), Ft. Campbell, KY	502-798-6989
Steve Mills CPT, USA	US Army Military Police School Attn: ATZN-CBI	205-848-3101
Stuart J. Schernstein	PM Small Arms, Attn: AMCPM-SA-LW Picatinny Arsenal, NJ	201-724-4778
Mark Siciliano LT, USN	NSWDG, Dam Neck, VA	804-433-7960
Steve Small	JSSAP Office, Attn: AMSTA-AR-CCJ Picatinny Arsenal, NJ	201-724-7043
Sam Spears CWO	US Coast Guard, Attn: G-ODO Washington, DC	202-267-1522 fax: 267-4278
Bob Spurlock	HQ AFSPA/SPRR (Requirements & Resources) Kirkland AFB, NM	505-846-1994
Tom Taylor	US Army Military Police School, SRT Training Office, Attn: ATZN-CBI	205-848-3805
Rick Warford SSA	Federal Bureau of Investigation (CIRG, STU) FBI Academy, Quantico, VA	703-640-1802
Larry Warner	Los Alamos National Laboratory PO Box 1663, MS F-655, Los Alamos, NM	505-667-2220
Jack Webb	US Secret Service, JJRTC, 9200 Powder Mill Rd. Laurel, MD 20708	301-344-8530
Ronald Webster GMC, USN GMCS(SW)	Naval Special Warfare Command, Attn: N432 San Diego, CA 92155	619-437-0909 fax: 437-0927

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Joint Service Small Arms Program (JSSAP)

The
Objective Personal Weapon (OPW)
"Shooter's Conference

22-23 February 1995
Picatinny Arsenal, NJ

Steve Small
(201)724-7043

Purpose of OPW "Shooter's Conference

- To exchange information on the tactical, training and safety requirements of military and law enforcement operators
- To capture this information in a report
- This report will serve as a steering document for the initial phase of the OPW concept exploration and definition process
- Additionally, this Conference will lay the foundation for the JSSAP Government/Industry OPW Conference (9-10 August 1995, Oak Ridge National Laboratory, TN)

Objective Personal Weapon (OPW)

DEFINED:

The third member of the Objective Weapons Family (JSSAMP)

THE ENVELOPE:

- Equal to, or larger than, the M9 Service Pistol; and/or smaller than the M4 Carbine
- Not a longarm, but not necessarily a pistol
- Provides operators with a distinct "value added" over existing weapons

May have Less-than-Lethal Capability
Primary capability is against human targets

Traditional role of Handguns, Sub-guns and Carbines

- Last chance personal defense for armored crews, aircraft crews, crew-served weapon operators and senior grade officers
- Second or backup weapons by military and/or law enforcement operators
- A short-barreled, lightweight weapon for highly trained, or special purpose, troops, i.e., Paratroopers, SOF.
- Typically designed for defensive purposes, some systems have missions specific "offensive" application involving stealth and stalking application
- Close-in combat in confined spaces, i.e, buildings, aircraft or watercraft

Historic examples of Personal Weapon employment

- Trench clearing during World War I
- Last resort self-protection by Marines in South Pacific (WWII)
- NCO and Officers, leader's weapon in Korean War
- Tunnel clearing in Vietnam War
- Downed Pilot protection in Desert Storm
- Since the late 19th century, a general component of the law enforcement operator's kit
- Since the 1970's, a part of the SWAT operator's kit

CPT John T. Thompson
US Army Ordnance Department

(From his 1904 report on self-loading pistols)

- Effective to 75 yards (69 meters)
- A simple, strong and durable mechanism
- A magazine capacity of at least six rounds
- Weapon should balance and handle well
- Terminal effects on human, rather than penetration, is the key
- Field strip without special tools
- Equipped with an effective safety device

Trade-offs of size/weight/configuration vs capability

- Ease of carry (and/or ease of concealment) tend to be reduced as increases are made in requirements for firepower, engagement range, or hit probability
- Lethality, and/or effectiveness, tend to remain more a function of hit placement than of the terminal ballistics
- One type of multi-purpose weapon may not suit a number of special or unique applications
- The development of a family of special application weapons may not be possible in light of the present economical/political environment

Technology is changing the nature of some of these relationships

Current Capabilities vs the Future Threat

How can we more effectively accomplish the mission?

- A change in our current doctrine, tactics, training or organization
- A materiel solution:
  - Modify an existing system
  - NDI approach
  - A service unique approach
  - New Joint-Service program

Shooter's Conference Guidelines

- The goal is not to evaluate specific types of hardware, handguns, sub-guns, carbines, or any specific sub-systems of these weapons

- What is needed to help assist us (in this effort) is a frank and clear definition of why systems of smaller size than longarms are necessary to military and/or law enforcement operations

- The questions we ask you to help us answer are how, when and under what circumstances are such weapons essential and most of all, why is this the case

Execution
Concept of the Conference

Agenda

0830-0840	Welcoming	COL Sinclair
0840-0855	The Concept	Mr. Small
0855-0910	JSSAMP	Mr. Goldman
0910-0925	Capture Plan	Mr. Tullington
0925-0945	USAMPS	CPT Mills
0945-1005	SOF (Seals)	GMC Webster
1005-1020	Break	
1020-1040	USN (Off HG)	Mr. Zeller

Execution
Concept of the Conference

Agenda (continued)

1040-1100	USMC	GySgt Marlowe
1100-1120	USAF	Mr. Spurlock
1120-1140	SOF	LT ~~Sisilano~~ Siciliano
1140-1315	Lunch	
1315-1335	USCG	CWO Spears
1335-1355	USAAMU	Mr. Boyd
1355-1415	FBI	Mr. Warford
1415-1435	USSS	Mr. Webb

Execution
Concept of the Conference

Agenda (continued)

1435-1445	Break	
1445-1545	Guided Discussion (Will focus on identifying deficiencies in the operational capabilities of existing systems)	Mr. Bowers
1545-1615	Guided Discussion (Opportunities to provide new capabilities)	Mr. Bowers/Dr. Warner
1615-1630	Initial feedback	Mr. Bowers
1630-1635	Administrative Remarks	Mr. Small

Execution
Concept of the Conference

Agenda - Day 2

0800-0810	Administrative Remarks	Mr. Small
0810-0900	"Point by point" Briefback	Mr. Bowers
0900-0910	Future plans and conclude	Mr. Small

J·S·S·A·P
JOINT SERVICE SMALL ARMS PROGRAM

JSSAP OPW Program/Industry - Government Conference

Future Plans

- Shooter's Conference Draft Report - Staffing complete by EOM March
- Conference Report Finalized - EOM March
- CBD published - EOM April
- Briefing to ADPA Small Arms Symposium - 27-29 June 1995
- Panel Leaders Meeting - July
- JSSAP Industry-Government OPW Conference - 9-10 August 1995

JSSAMP

Presented By

Mr. Joel M. Goldman
JSSAP Office
DSN880-6906
FAX DSN880-6930

Small Arms Definition

Manportable, Individual and Crew-Served Weapon Systems Used against Protected and Unprotected Personnel and Light/Unarmored Vehicles. Included among these Weapon Systems are Ballistic and Non-Ballistic Systems and Associated Munitions, Aiming, Powering Storage and Other Ancillary Items.

JSSAP Mission

- Harmonize and Execute Joint RDTE Projects
- Identify and Apply Technology Base
- Establish Joint Service Requirements
- Transition to PM's for Full Development/Production

Joint Service Small Arms Program

MANAGEMENT COMMITTEE

Chairman: COL T. J. Sinclair (Commander, CCAC)

Principal Members:

Army	COL W. Patterson (USAIS)
Marines	COL G.D. Dockendorff (MCSC)
Air Force	COL S. Shoemaker (HQ AF/SPX)
Navy	Mr. Ronaldi (HQNAVSEASYSCOM)
Coast Guard	CAPT D. R. Grosse (HQUSCG)
SOCOM	Mr. T. Gannon (HQSOCOM)

JSSAP Management Structure

JSSAP MANAGEMENT COMMITTEE*

Chairman
(CCAC)

- **Working Groups**
  - **Technology**
  - **Application**
  - **Development/Production**
- **Program Office**

*Principal Members

- Army
- Navy
- Coast Guard
- Air Force
- Marine Corps
- SOCOM

Vision Statement

The JSSAP Management Committee

Committed to:

- Improving Small Arms Capabilities
- Creating Devastating Firepower vs any Enemy
- Enhancing our own Forces Survivability

Dedicated to:

- Developing a Joint Service Small Arms Master Plan
- Keeping our Front Line Forces Always Ready

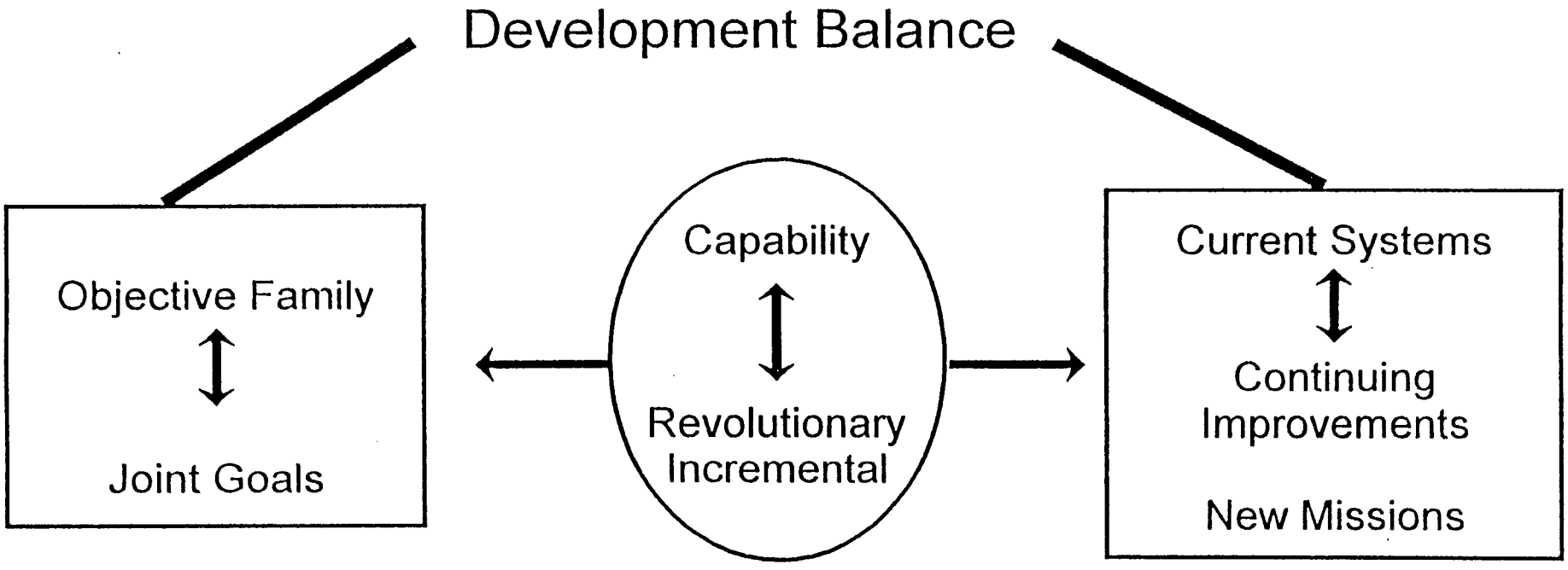
OBJECTIVE

A document which:

- Accurately Reflects The Needs of The Joint Services
- Serves As A Guidepost For Small Arms Development

J·S·S·A·P
JOINT SERVICE SMALL ARMS PROGRAM

PHILOSOPHY


Development Balance
Objective Family
Joint Goals
Capability
Revolutionary
Incremental
Current Systems
Continuing
Improvements
New Missions

Joint Service Small Arms Master Plan

- Objective Family of Small Arms
  - Individual Combat Weapon
  - Crew-Served Weapon
  - Personal Defense Weapon
- Sniper Weapon
- Mission Specific Weapons
- Technology Advancement

JSSAMP

Objective Family of Small Arms	*Fielded System Improvements*
Objective Individual Combat Weapon Objective Crew-Served Weapon Objective Personal Weapon	Modular Weapon Modular Fire Control BSTING Training Ammo Controlled Penetration Mounts
Mission Specific Weapons	*Technology Advancement*
Combat Shotgun Sniper Weapon Offensive Handgun Line Throwing Device	Non-Conventional Tgt Effects Lighter/Stronger Materials Precision Strike Higher Velocity Launch Objective Family P3I

J.S.S.A.P. JOINT SERVICE SMALL ARMS PROGRAM

Individual Combat Weapon (ICW)

Joint Goals	
Weight Lbs	<10
Range (m)	500 1000
Probability of Hit	.9 @ 500m (Point Target) .5 @ 1000m (Area Target)
Suppression	High At All Ranges
Targets	Individual Personnel w/Body Armor Groups of Personnel Light Vehicles/Vessels Personnel in Fortifications Slow/Low Flying Aircraft
Timeframe	2000
Operational Environment	All-Weather, 24 Hours, Air, Land, Sea

J·S·S·A·P JOINT SERVICE SMALL ARMS PROGRAM

Crew-Served Weapon (CSW)

Joint Goals	
Weight Lbs	<38, 2-Person Crew
Range (m)	2000
Probability of Hit	.High @ 2000m
Suppression	High At All Ranges
Targets	Groups of Personnel Light Vehicles/Vessels Slow/Low Flying Aircraft
Timeframe	2000
Operational Environment	All-Weather, 24 Hours, Air, Land, Sea

Personal Defense Weapon (PDW)

Joint Goals	
Weight Lbs	1.5 3.0 (Fully Loaded)
Range (m)	100
Probability of Hit	.9 - 1.0 @ 50m .5 @ 100m
Targets	Individual Personnel w/Body Armor Unprotected Personnel
Timeframe	2000
Operational Environment	All-Weather, 24 Hours, Air, Land, Sea

J·S·S·A·P
JOINT SERVICE SMALL ARMS PROGRAM

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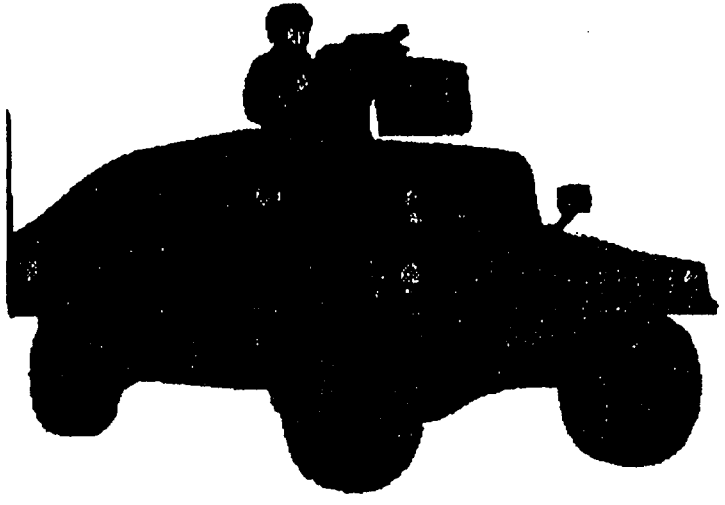


MILITARY POLICE PERSONNEL DEFENSE WEAPON REQUIREMENTS

USAMPS BATTLE LAB SUPPORT DIRECTORATE

MP Battlefield Missions

- Battlefield Circulation Control
  - Mobility
  - Intelligence
- Area Security
  - Rear Area Response Force
  - Critical Site Security
- Enemy Prisoner of War Operations
- Law & Order Operations

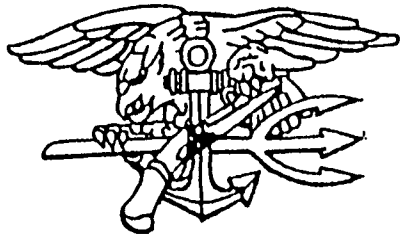
**** MP are The Army's Doctrinal Rear Area Combat Force in Support of The Combined Arms Effort .... FM 100-5**

Threat

- Dismounted Forces
- Thin Skinned Vehicles
- Special Operations Forces
- Airborne & Air Assault Forces
- Individuals and Groups (Tactical Garrison Environment)

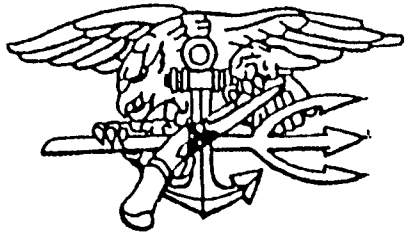
MP PDW REQUIREMENTS

- OUT TO 150 METERS
- MUST RETAIN LAW & ORDER CAPABILITY:
  - PISTOL/HOLSTER CAPABILITY IS REQUIRED FOR LAW & ORDER
  - PDW SHOULD HAVE CAPABILITY TO DO BOTH FUNCTIONS
  - IF NOT, MP MUST RETAIN PISTOL IN ADDITION TO PDW
- MP BATTLEFIELD MISSIONS INCLUDE DISMOUNTED & MOUNTED CAPABILITY
- MOUT, OPERATIONS OTHER THAN WAR AND FORCE SIGNATURE ARE KEY CONSTRAINTS/CONSIDERATIONS FOR PDW
- MPs ALSO PERFORM CLOSE QUARTERS COMBAT (SRT)
- BOTTOM LINE: PDW OPERATIONAL REQUIREMENTS DOCUMENT MUST INCLUDE MP UNIQUE REQUIREMENTS



OBJECTIVE PERSONAL WEAPON

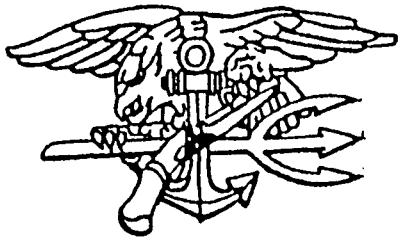
OBJECTIVE PERSONAL WEAPON (OPW) "SHOOTER'S CONFERENCE" 22 FEBRUARY 1995 JOINT SERVICE SMALL ARMS PROGRAM



OBJECTIVE PERSONAL WEAPON

CURRENT NAVSPECWARCOM INVENTORIES:

Pistols	Sig Sauer P226
	M1911A1
	S&W 686
	H&K P9S
Submachine guns	
	H&K MP5N
	H&K MP5SD3
	H&K MP5K
Carbines	
	Colt 727



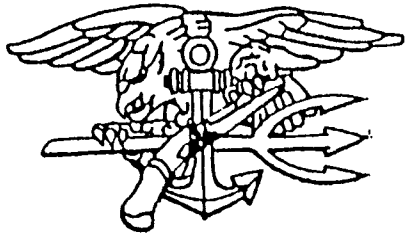
OBJECTIVE PERSONAL WEAPON

Tactical Deployment

Pistols - Generally deployed in secondary mode as a backup to the primary weapon but may be utilized as the primary weapon during CQB or during periods where the physical environment limits the use of the primary weapons.

Submachine gun - Generally deployed as a primary weapon in operations where over penetration is a concern , or noise suppression is required. May be deployed as a secondary weapon for personnel deployed as mission specialist such as snipers.

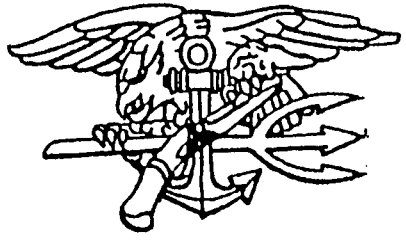
Carbines - Generally deployed as a primary weapon with single shot and full automatic modes of fire. May be deployed with a noise suppressor.



OBJECTIVE PERSONAL WEAPON

Training

All small arms are routinely fired during training missions. Navy SEAL teams train with their small arms at various government ranges , private ranges, and shooting schools around the country. These training exercises are often quite intensive, with personnel firing several thousand rounds from their training weapon during a week long session.



OBJECTIVE PERSONAL WEAPON

Safety / Environmental Issues

Small arms carried by Naval Special Warfare personnel must be reviewed by the Navy's Weapon Systems Explosive Safety Review Board.

Area's of concern;

- In-sensitive munitions
- HERO safe
- Dual fuzing
- Simplicity of design to avoid operator error
- Airborne lead
- Eye safe
- Corrosion Resistance

OBJECTIVE PERSONAL WEAPON

Capabilities and Characteristics for OPW

Size:	Smaller is better
Weight:	Lighter is better
Reliability:	More is better
Cost:	Cheaper is better
Human factors:	Simple is better

NAVAL SPECIAL WARFARE COMMAND

OBJECTIVE PERSONAL WEAPON

Capabilities and Characteristics for OPW

Ergonomics -	Capable of being carried as a secondary weapon on your person.
	" " utilized with only one hand.
	" " utilized by either right or left hand.
Lethality -	One shot incapacitation, level IIIA body armor penetration
Service Life -	10 year life
Signature -	Low, both visual & audible
Accuracy -	Head shot 25-50 meters
Reliability -	99.95%
Ao-	Operational Availability 99%
Maintenance -	Low, majority performed at local unit level
Environmental -	96 hour Mil-Std-810 salt fog, surf zone, hot (+160), cold (-40), sand/dust, mud, etc.
Training-	Capable of being fired on existing ranges, sub-caliber training add-ons, frangible projectiles, tracers, marking ammunition, etc.
	Capable of being utilized in low and no light operations.

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HEADQUARTERS
AIR FORCE SECURITY POLICE AGENCY

ROBERT E. SPURLOCK
BRIEFER

USAF OPW CRITERIA USERS

- SECURITY POLICE
- SPECIAL OPERATIONS
- COMBAT CONTROL
- TACTICAL AIR CONTROL
- RESCUE
- AFOSI
- AIRCREWS AND MISC OTHERS

USAF OPW CRITERIA MISSIONS

- LAW ENFORCEMENT
- BASE DEFENSE
- MISSION SECURITY
- ASSET SECURITY
- VIP PROTECTION
- PERSONAL DEFENSE
- WORK AREA SECURITY

USAF OPW CRITERIA
REQUIRED CAPABILITIES

- EFFECTIVE RANGE: 0 TO 50 METERS
- INSTANT INCAPACITATION
- RAPID FIRE & RAPID RELOAD
- SEMI & AUTOMATIC FIRE
- WEIGH LESS THAN 3.0 LBS LOADED
- OWNER OPERATION ONLY
- LOW LIGHT, POINT & SHOOT
- ONE HAND OPERATIONS

so-called "safe gun" knows its owner

USAF OPW CRITERIA REQUIRED CAPABILITIES

- CONCEALABLE
- RELIABLE
- HIGH CARTRIDGE CAPACITY
- CORROSIVE RESISTANT (SALT WATER)
- PENETRATE ARMOR @ 50 METERS
- AIRCREW EQUIPMENT COMPATIBLE
- EASILY MAINTAINED

UNITED STATES AIR FORCE RESPONSE

OBJECTIVE PERSONAL WEAPON WORKSHEET

Who Uses Personal Weapon?

- Security Police for law enforcement, installation defense, protective services operations, prisoner control, convoys, and various other security duties.

- Air Force Special Operations Special Tactics Teams for personal and mission defense.

- Air Rescue and Recovery personnel including pilots, flight engineers, and pararescuemen.

- Tactical Air Control personnel both officers and enlisted.

- Combat Control Teams.

- Air Force Office of Special Investigations agents.

- Various aircrew members.

- Several other functions who are armed for owner protection of specific facilities, assets, or missions. Examples are finance for funds escort, munitions personnel for security of work areas, couriers for security of items in transit.

Where are Personal Weapons Used?

- Virtually anywhere AF people are located or can go for operations. For example, on AF installations, various field locations, in buildings, etc.

How are Personal Weapons Used?

- Both defensively and offensively.

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Under What Conditions are Personal Weapons Used?

- Day, night, hot and cold temperatures, dry and humid environments, rain, snow, wind, and salt air and water.

Why are Personal Weapons Used?

- They are available. That is it may be the arming weapon of choice, other weapons not operative for several reasons, and the situation has evolved to the point deadly force is necessary.

Which Weapon Characteristics are Required?

- Minimum range: Point blank.
- Maximum effective range: 100 meters desired, 50 meters acceptable.
- Semiautomatic and automatic capable.
- One owner operations, that is inoperative for other than "owner".
- Operate with one hand including reloading.
- Low light sighting system.
- Aim point system. Ie., point and shoot.
- Concealable on a man or woman.
- Light weight: < 1.5 lbs unloaded, < than 3.0 lbs loaded.
- Reliability: > than 99%.
- More than ten round capacity.
- Corrosive resistant. Must allow prolonged exposure to salt water, snow, ice, etc.
- Rapid reload.
- Ambidextrous operations.

- Safe until trigger is pulled.

- Compatible with fighter type aircraft aircrew equipment such as parachute harness and survival vest.

- Penetrate personal body armor to at least 50 meters.

- Directed energy weapons should be ultimate goal. They should have "dialable" energy levels so shooter can select desired level of damage. Possess virtually 100% instantaneous incapacitation capability.

Secret Service Requirements For Objective Personal Weapon

(BRIEFER: Special Agent Jack Webb
@ the 22-23 Feb 1995 - Shooter's Conference)

- Current Requirement for OPW in Protection

- *Range Requirement* -- 200 Meters Desired

- *Size Requirement* -- Smaller Than MP5 Desired

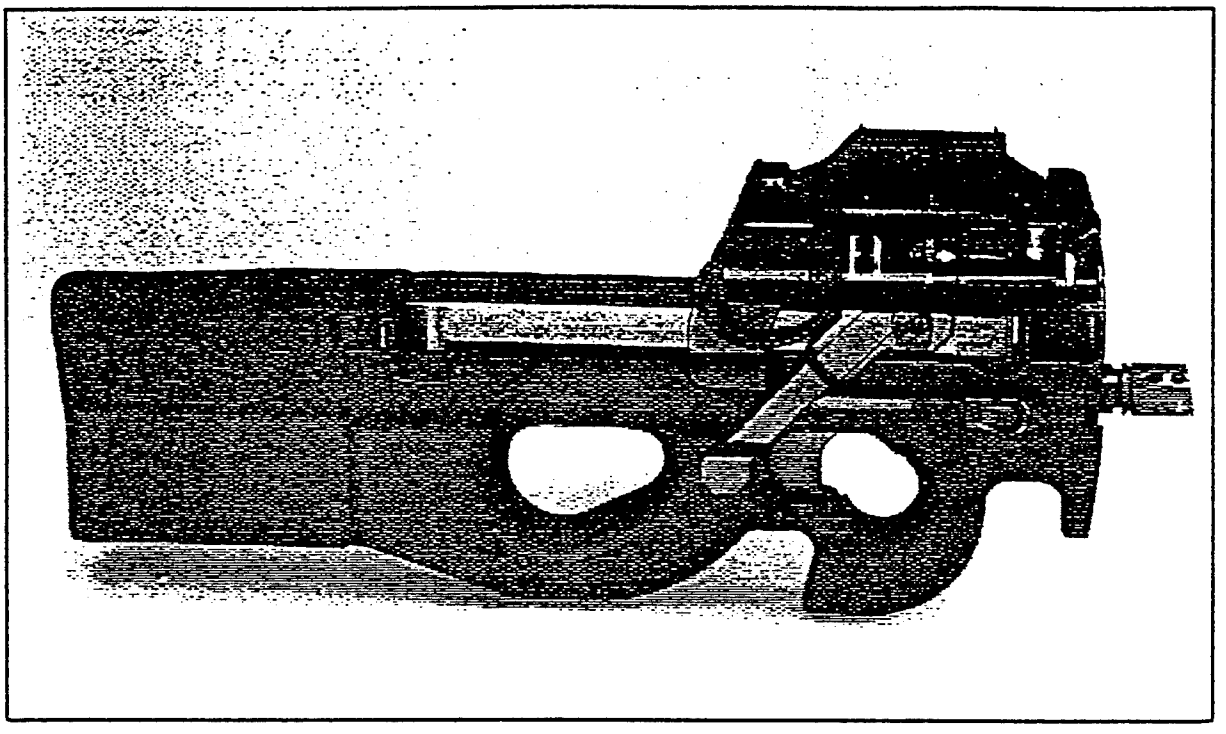
- *Reliability Requirement* -- Commercially Reputable Manufacturer Required

- *Functional Requirement* -- Easy Manipulation & Clearing of Malfunctions

- *Ammunition Requirement* -- Commercially Available Hollowpoint Desired

- *Requirement for Concealedness* -- Easily Concealed by a Bicycle Rider

THE 5.7 x 28 mm WEAPON SYSTEM



WEAPON SYSTEM DESCRIPTION

The 5.7 x 28 mm weapon system comprises the P90 submachine gun and a full range of 5.7 mm rounds. This weapon system incorporates the latest state-of-the-art technology in both gun and ammunition design to maximize lethality while minimizing the size and weight of the system.
The basic weapon is ideally suited to the requirements of support units, while a full range of accessories makes the P90 a highly effective system for special operations, anti terrorist, and V.I.P. protection roles.

WEAPON FEATURES

-Low recoil for maximum accuracy and control.

-Fully ambidextrous.

-Moving parts require little or no lubrication.

-Reflex sight with Tritium illuminated reticle.

-No tools disassembly.

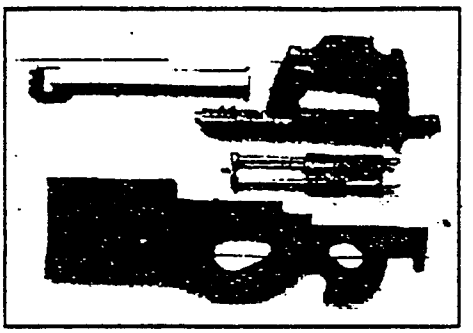
-High capacity magazine with see-through magazine.

-Compact size.

-Semi-Auto and Full Auto capability.

WEAPON CHARACTERISTICS

ACTION :	Blowback from closed breech.	
MAGAZINE CAPACITY :	50 rounds.	
RATE OF FIRE :	900 rpm.	
MAX. EFFECTIVE RANGE :	150 m.	
ACCURACY :	4 mils.	
OVERALL LENGTH :	50 cm.	(19.7 in.)
BARREL LENGTH :	26.3 cm.	(10.3 in.)
WIDTH :	5.5 cm.	(2.2 in.)
HEIGHT :	21 cm.	(8.3 in.)
WEIGHT :	2.54 kg empty.	(5.6 lb.)
	3 kg loaded	(6.6 lb.)



Field stripping

ACCESSORIES : Laser aiming pointer, tactical light, sound suppressor, combat sling, blank firing, cleaning kit and magazine filler.

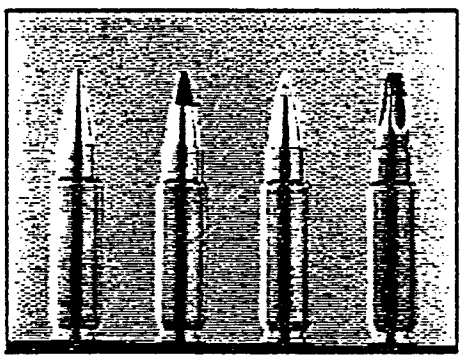
AMMUNITION FEATURES

A whole range of 5.7 mm rounds is available. It includes a Ball round (SS190), a tracer round, a blank round and a subsonic round.

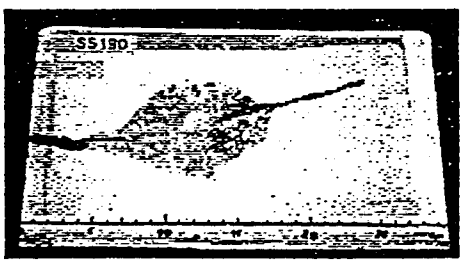
The SS190 projectile perforates more than 48 of kevlar body armor at 150 meters.

It has also been designed for maximum wound profiles. 90% of kinetic energy is transferred into the body, thus creating a large crush cavity, without over penetration.

This projectile being lead-free also eliminates range contamination.



5.7 x 28 mm ammunition range



SS190 wound profile in NATO gelatin block at 10 m range.

AMMUNITION CHARACTERISTICS

CARTRIDGE LENGTH :	40.5 mm.	(1.6 in.)
CARTRIDGE WEIGHT :	6 g.	(93 grains)
PROJECTILE WEIGHT :	2.02 g.	(31 grains)
RECOIL :	1/3 of 5.56 mm round	
MUZZLE VELOCITY :	715 m/s.	(2 346 ft/sec.)
MUZZLE ENERGY :	500 J.	(370 ft/lb)
CHAMBER PRESSURE :	345 MPa.	(50,500 psi.)

FN HERSTAL

Fabrique Nationale Nouvelle Herstal S.A.
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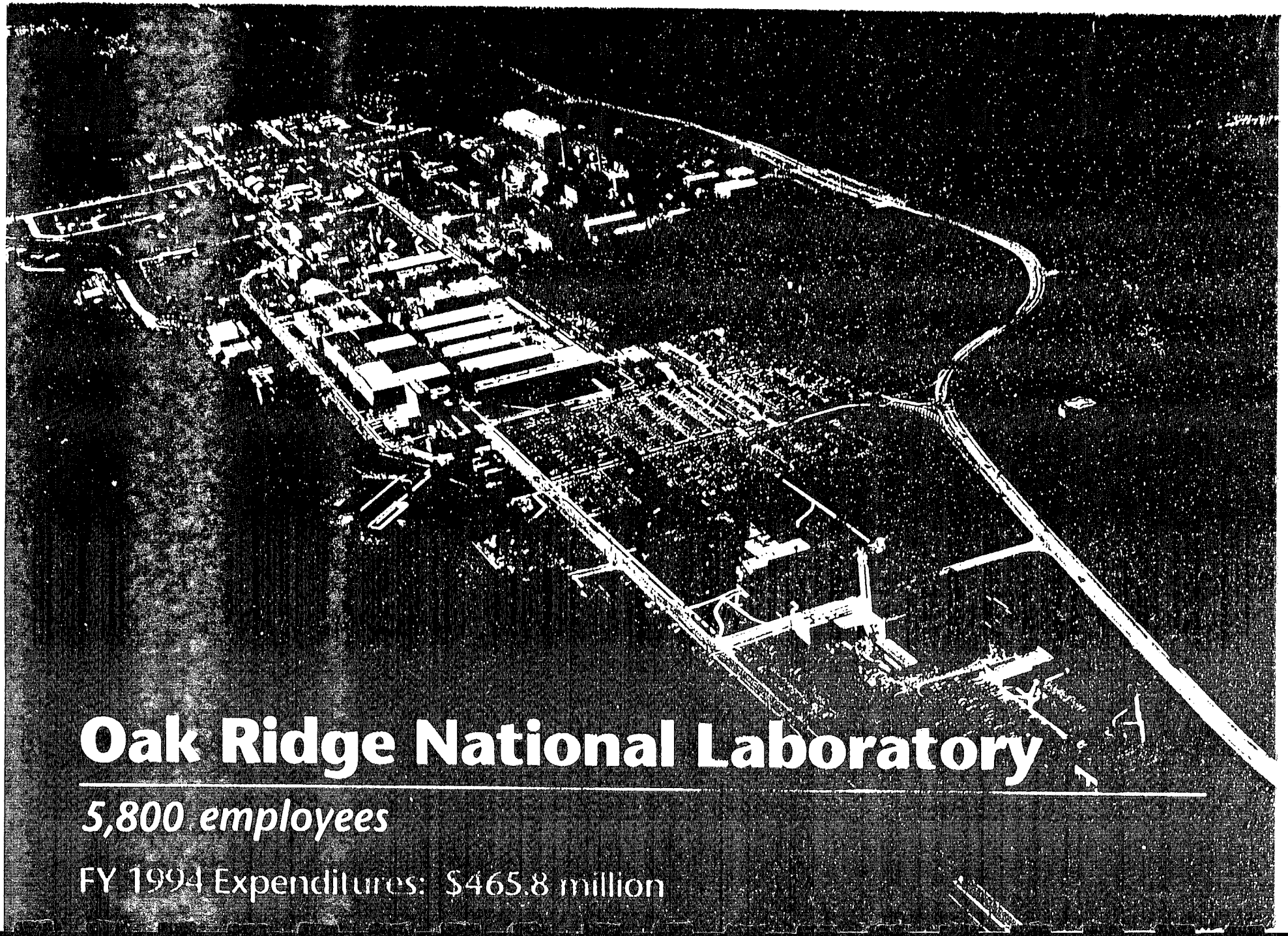
Oak Ridge

JSSAP Conference
22-23 Feb. 1995

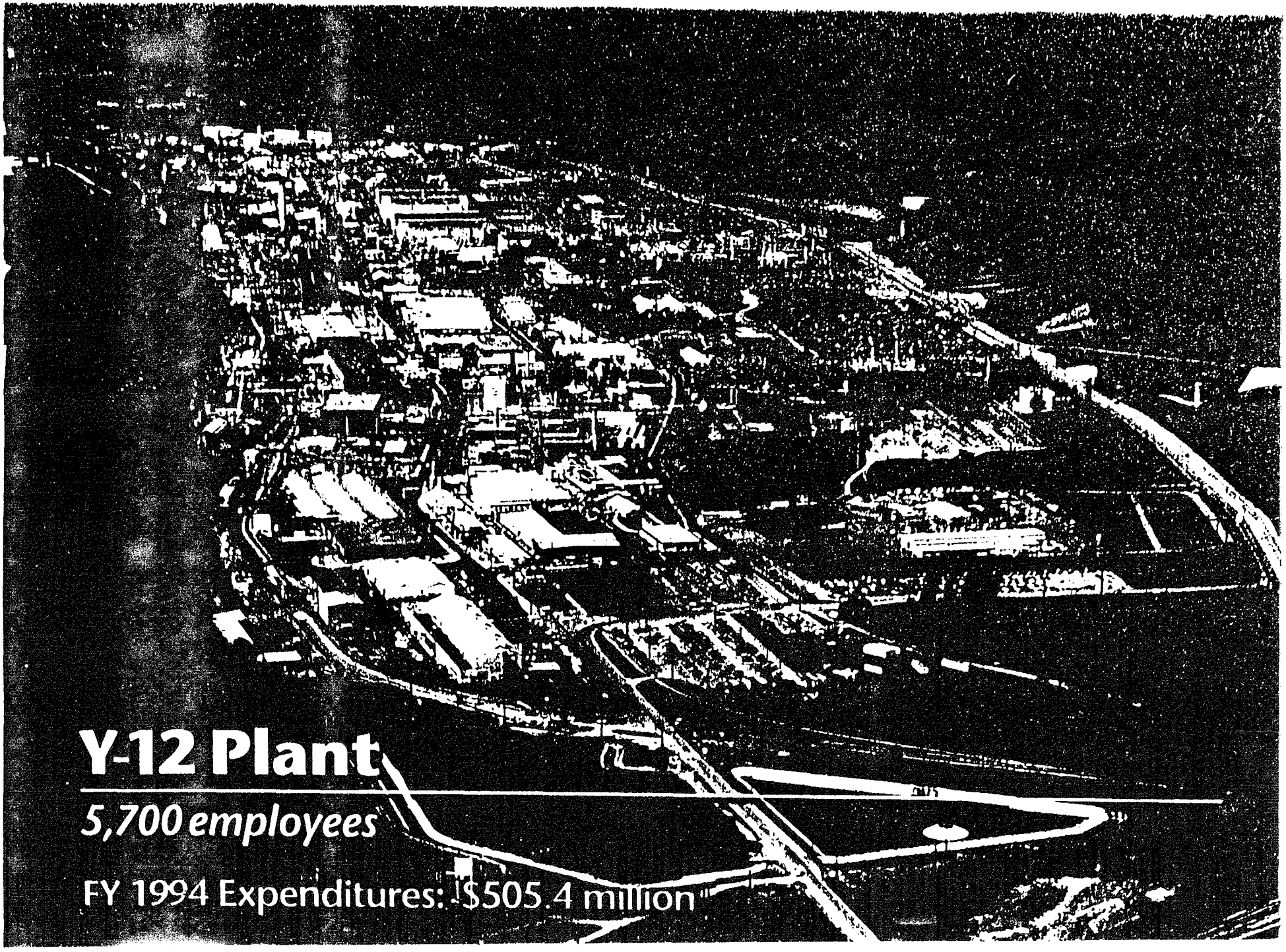
Leo E. Labaj
Special Projects Office
(615) 241-3295



Oak Ridge National Laboratory

5,800 employees

FY 1994 Expenditures: $465.8 million


Y-12 Plant
5,700 employees
FY 1994 Expenditures: $505.4 million

Environmental Restoration and Waste Management

3,200 employees

FY 1994 Expenditures: $1213 million

Special Projects Office

- Department of NSP, [illegible]
- SPO develops and [illegible]
  - Hardware and technical support for special activities
  - Includes all Oak Ridge complex technologies
  - DOE and Other Federal Agency sponsors
- [illegible]
  - Arms control, treaty verification
  - Non-proliferation, counterproliferation
  - Intelligence and counterintelligence
  - Countermarcotics, counterterrorism
  - Law enforcement
  - Special Operations

Oak Ridge | Special Projects Office

SPO Sponsor Base

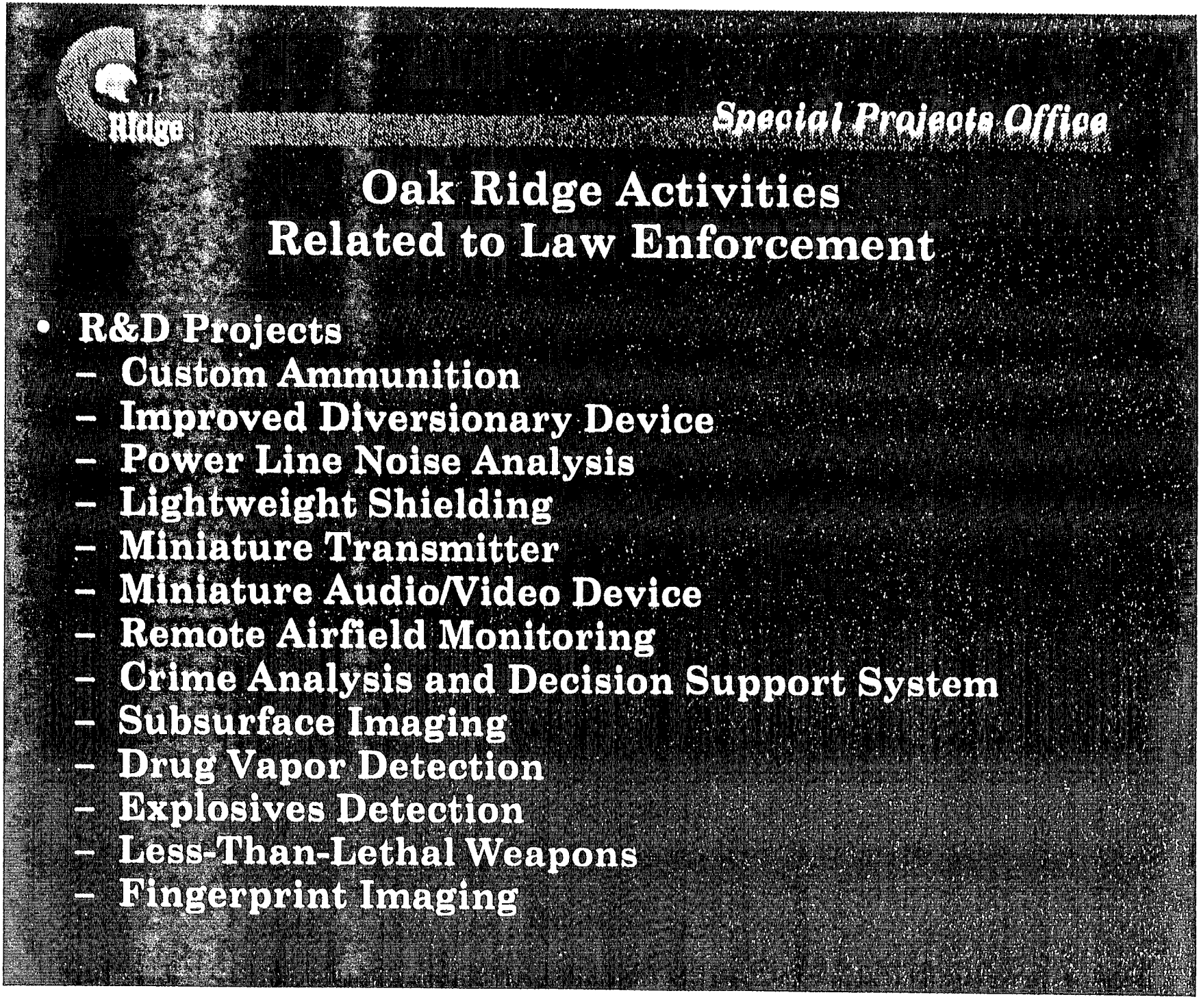
Charter (from DOE Office of Intelligence & National Security):

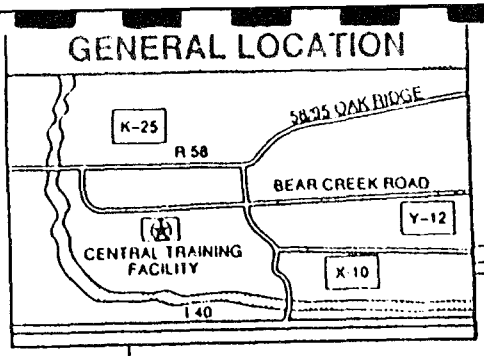
- Intelligence community
  — CIA, DIA, NSA, DOE, FAA, DOS, etc.
- Law enforcement/security
  — FBI, DEA, DOE, Secret Service, Customs/INS, NIJ, etc.
- DoD Special Operations
  — JSOC, SOCOM, DevGroup, NAVSPECWARCOM, etc.
- Arms control community
  — DNA, OSIA, DOE, IAEA, etc.

Oak Ridge Activities Related to Law Enforcement (2)

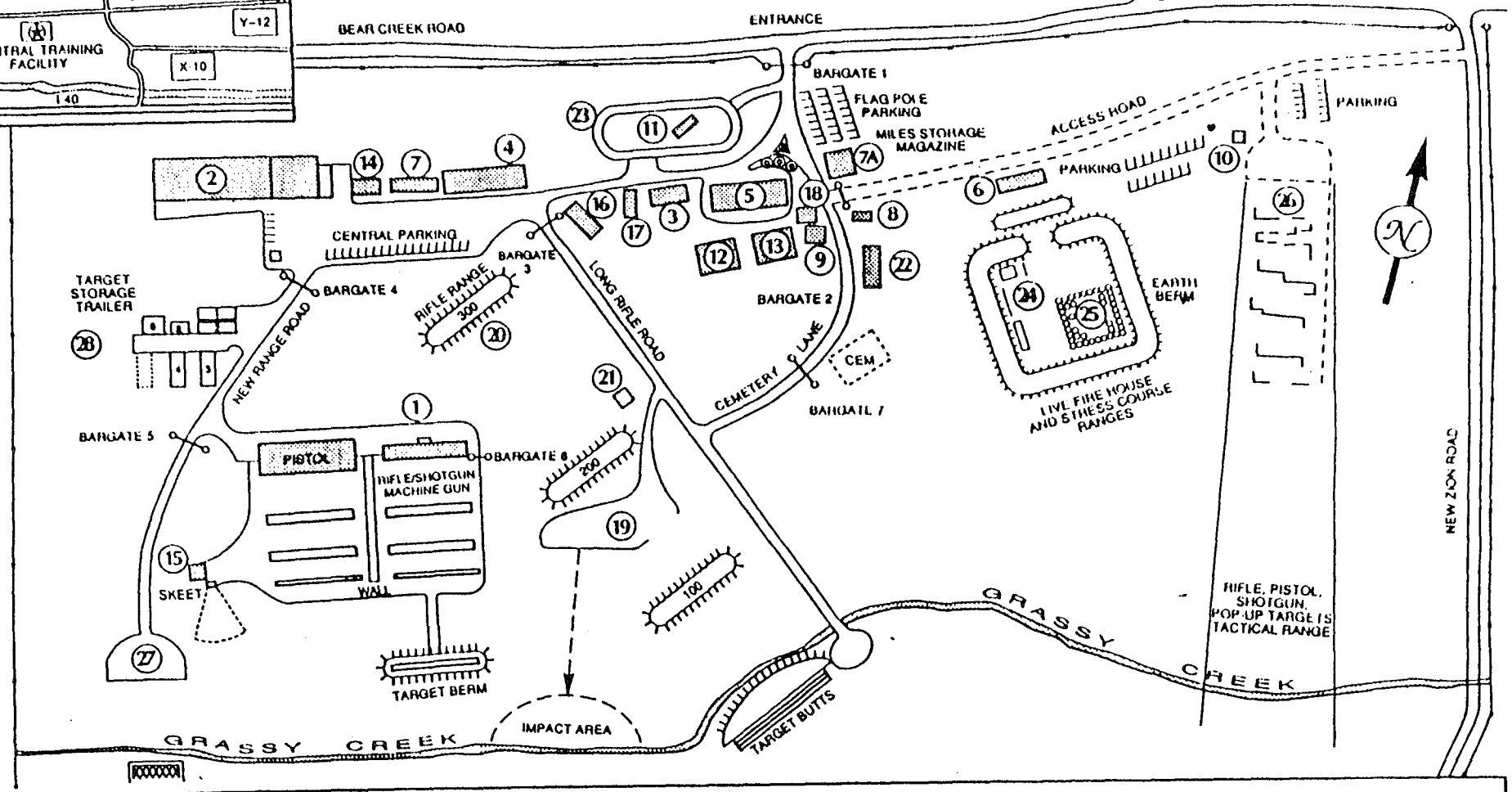
- Technology Exhibitions
  - EXPO
  - National Sheriffs Association
  - International Association of Chiefs of Police
  - Ad hoc support to NIJ

- Operational/Technical/Investigative Support
  - USDA Forestry Service
  - Colombia
  - SW border counternarcotics operations
  - Support to Barcelona
  - Zachary Taylor
  - Video image enhancement

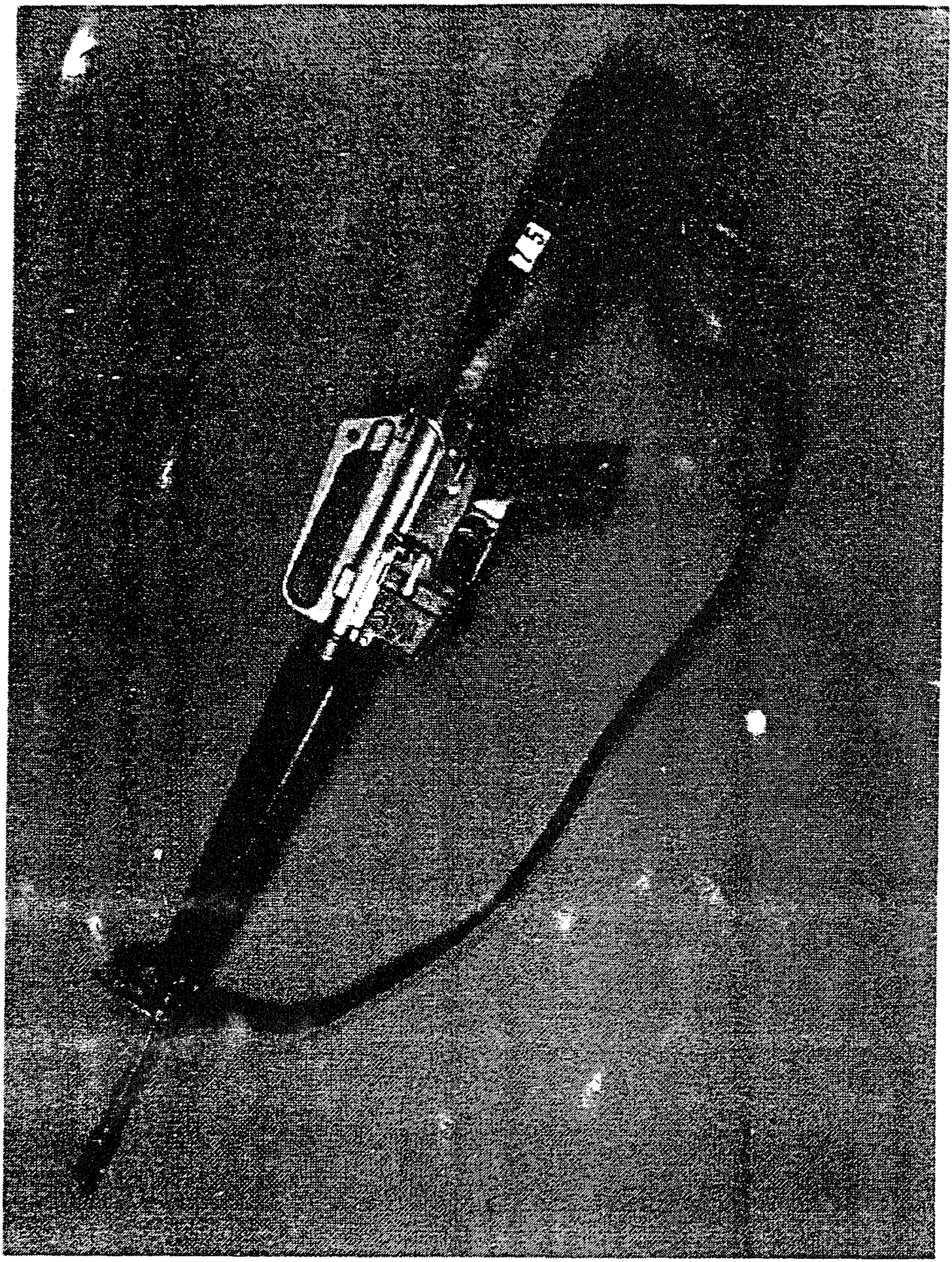

Ridge
Special Projects Office
Oak Ridge Activities
Related to Law Enforcement
• R&D Projects
– Custom Ammunition
– Improved Diversionary Device
– Power Line Noise Analysis
– Lightweight Shielding
– Miniature Transmitter
– Miniature Audio/Video Device
– Remote Airfield Monitoring
– Crime Analysis and Decision Support System
– Subsurface Imaging
– Drug Vapor Detection
– Explosives Detection
– Less-Than-Lethal Weapons
– Fingerprint Imaging



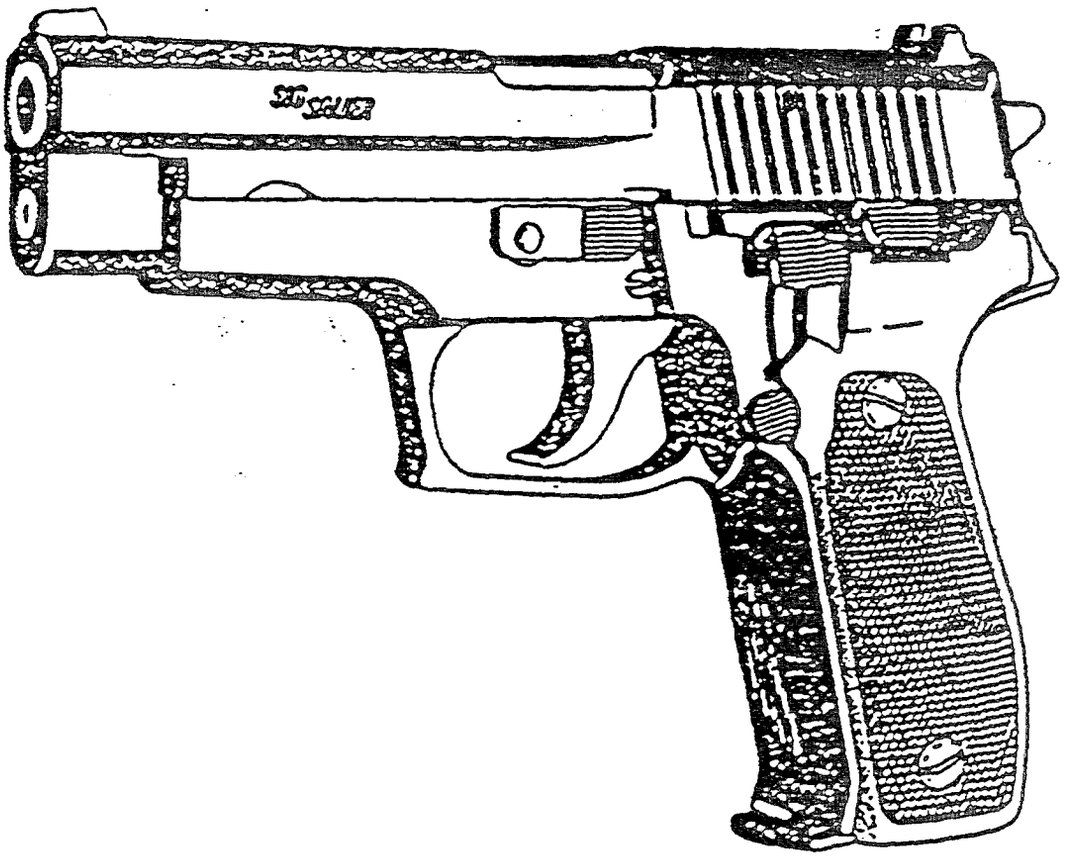
CENTRAL TRAINING FACILITY



(1)	K-1654 RIFLE RANGE OUTDOOR (150 ACRES)	(8)	K-1654-G SHED STORAGE (GREEN MAINT. BLDG.)	(15)	K-1654-N STORAGE BUILDING	(22)	GAS TRAINING FACILITY
(2)	K-1654-A INDOOR FIREARMS FACILITY	(9)	K-1654-H STORAGE BUILDING	(16)	K-1654-O STORAGE BUILDING	(23)	1/8 MILE TRACK
(3)	K-1654-B CLASSROOM 5, SAFETY OFFICE, OFFICES	(10)	K-1654-I STORAGE SHED (TACTICAL AREA)	(17)	K-1654-P F.A.T.S. BUILDING	(24)	LIVE FIRE STRESS COURSE
(4)	K-1654-C TRAILER LUNCHROOM SW	(11)	K-1654-J CLASSROOM 3 &4 (P.T. CENTER)	(18)	K-1654-Q TACTICAL OFFICE	(25)	LIVE FIRE HOUSE
(5)	K-1654-D RANGE OFFICE, OFFICES CLASSROOM 1 & 2	(12)	K-1654-K TRAILER MOBILE OFFICE COMPLEX DW	(19)	ARMORED VEHICLE RANGE	(26)	LIVE FIRE TACTICAL RANGE
(6)	K-1654-E TACTICAL TRAINING CLASSROOM 6	(13)	K-1654-L TRAILER MOBILE OFFICE COMPLEX DW	(20)	300 YD. RIFLE RANGE	(27)	MACHINE GUN SIGHT-IN RANGE
(7)	K-1654-F GUN CLEANING BUILDING	(14)	K-1654-M ARMORY WEAPONS BUILDING	(21)	40 FT. SHOOTING TOWER	(28)	AMMUNITION MAGAZINE
(7A)	Miles Storage Area					◎	FLAG POLES



SIG SAUER P-226



Appendix C
Bibliography

Appendix C
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Appendix D
Supplemental Data Obtained From FBI Academy, Quantico, VA

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Supplemental Data Obtained From FBI Academy, Quantico, VA

Historical engagement data obtained from Special Agent Rick Warford, FBI Academy, Quantico, VA, is given on pages 89 through 91 along with the graphical analysis as shown in Figures 1 through 3.

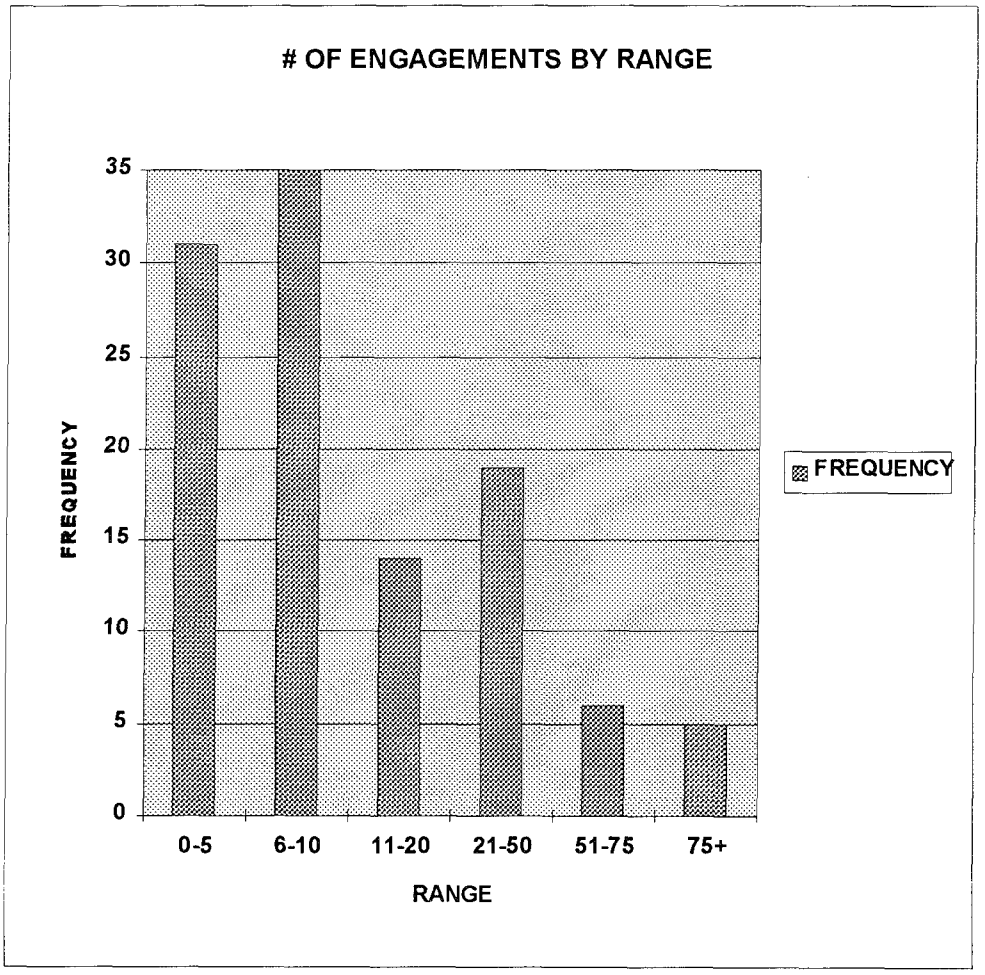

Figure 1. Number of engagements by range

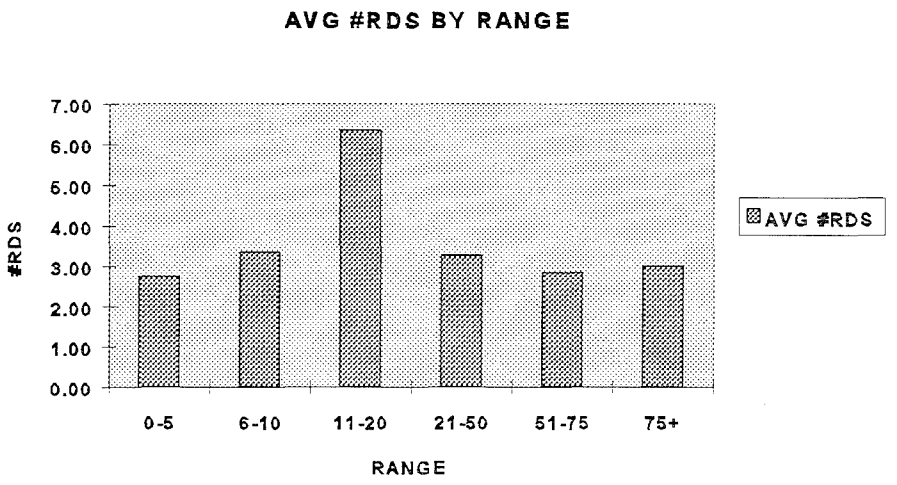

Figure 2. Average number of rounds fired by range

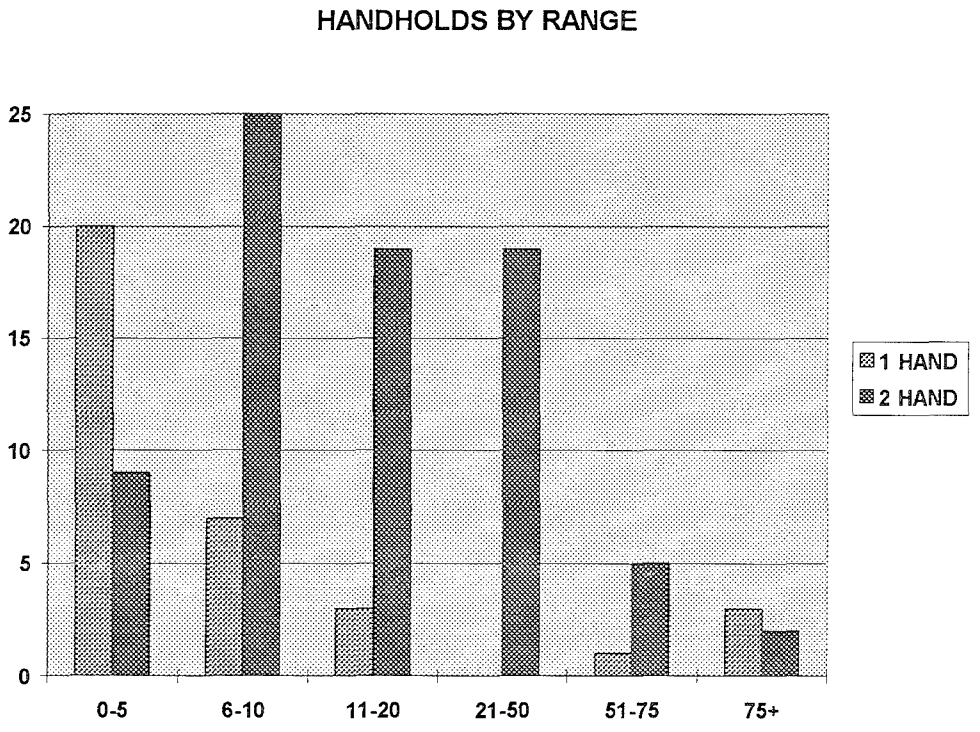

Figure 3. Handholds (1 hand or 2 hands) by range

HANDGUN SHOOTING INCIDENTS
1989 - 1994
FBI AGENTS ONLY

1/25/95 GDG

DISTANCE	AGENTS	ROUNDS FIRED	AGENTS FIRED 1 HANDED	AGENTS FIRED 2 HANDED	
0'-5'	31	85	20	9	2UNK
6'-10'	35	117	7	25	4UNK
11'-20'	14	89	3	19	1UNK
21'-50'	19	62	0	19	
51'-75'	6	17	1	5	
75' +	5	15	3	2	
	110	358	34	70	7UNK

AVERAGE # OF SHOTS FIRED PER AGENT – 3.25 RDS

AVERAGE # OF SHOTS FIRED EACH DISTANCE PER AGENT

0'-5' — 2.74 RDS
6'-10' — 3.34 RDS
11'-20'— 6.36 RDS
21'-50'— 3.26 RDS
51'-75'— 2.83 RDS
75' + — 3.00 RDS

SHOTGUN SHOOTING INCIDENTS
1989 - 1994
FBI AGENTS ONLY

DISTANCE	AGENTS	SHOTS FIRED	AVERAGE # SHOTS/AGENT
0' - 5'	2	4	2
6' - 10'	5	11	2.2
11'- 20'	6	8	1.33
21' - 50'	11	19	1.72
51' - 75'	3	17 (16 gas shot shells)	5.67
75' +	2	3	1.5
	29	62	2.14

MP-5 SHOOTING INCIDENTS
1989 - 1994
FBI AGENTS ONLY

1/25/95 GDG

DISTANCE	AGENTS	ROUNDS	AVG. # RDS FIRED/AGENT
0' - 5'	3	26	8.66
6' - 10'	6	73	12.1
11' - 20'	3	8	2.66
21' - 50'	5	78	15.6
51' - 75'	2	9	4.5
75' +	2	4	2.0
TOTAL	21	198	9.43 RDS/AGENT